DOCTOR OF PHILOSOPHY

Clinical Competency in Oral Surgery
History, Challenges and Solutions

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CHAPTER 3

Clinical Data Collection.

3.0 The Basis for Collecting Clinical Data and Real Time Assessment.

Today it is a sine qua non that training in any of the professions entails recording and examination of the acquisition of the skills required to perform them. To do otherwise is now unthinkable. So how has the assessment of the student developed in DUDS and how do we know that the assessment, now extant, confirmed their competency and finally did it need changing?

There is an overarching need to implant the core competencies. Chambers 1994 defined core competencies as *'tools that focus on what graduates must be able to do when they start practice on their own.'* [2] Technical skill is one such tool for dentistry modified by situation management and professional attitude. Presently simple exodontia is a core competency technical skill needed to become a dentist.

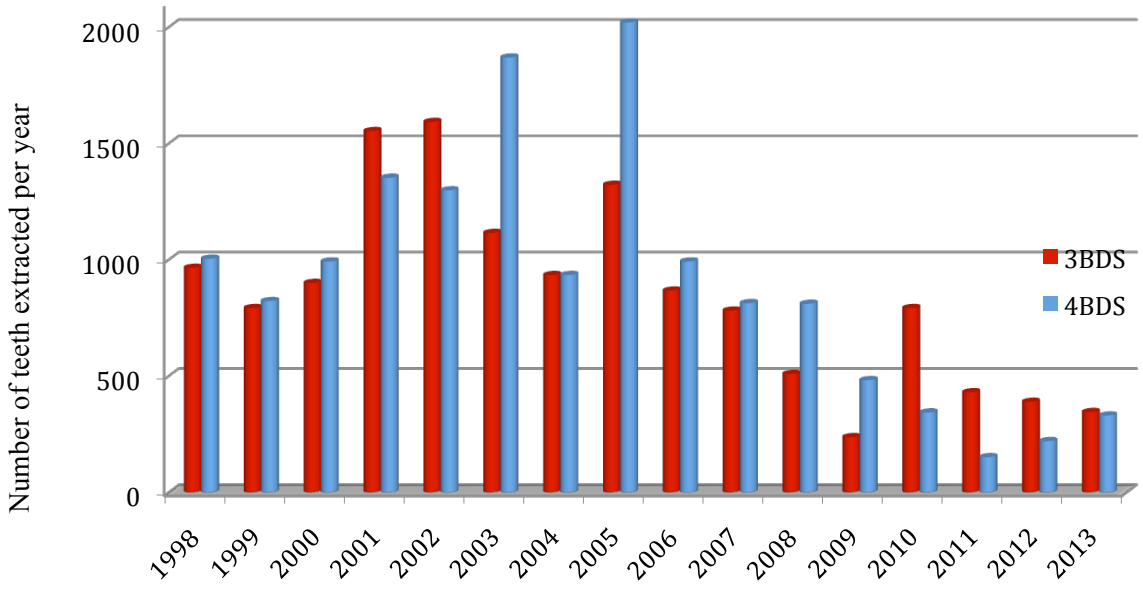
To be a competent individual the student has to be *"one capable of independent, safe clinical functioning with a degree of contingency solving".* [8] The progression towards competency begins in the undergraduate but will progress from beginner on graduation to expert after ten years of acquiring increasing experience. The ideal is now a '*safe beginner'* which is better than the absolute one of do they have competency, yes or no, with the inherent 'competency' being contentious to define. [8] There being degrees of safety and allows for different paces at which the undergraduate acquires skill and levels at which it is acceptable to allow them to qualify to practice.

The Association of British Academic Oral and Maxillo-facial Surgeons (ABAOMS) 2008 listed core competencies and their assessments and found that Schools assessed exodontia via summative and longitudinal formative assessment. [38]

3.1 Evolution of Clinical Data Collection in Dundee University Dental School.

In the 30s – 60s the extractions students performed were collated as a bare number with no comment on ability or difficulty. In the 1970s the patient name and number was recorded and the tooth which had been extracted. It was only counted if the student got the tooth out and there was no acknowledgement of the difficulty of the extraction and no grading or marking for it. The number of teeth extracted by each student "ran into the hundreds" - an estimate from a 1976 graduate. This was at a time when there was still a GDC requirement for the undergraduate to have given general anaesthetics for exodontia patients. The number of teeth extracted by each student has fallen dramatically over the intervening years. (Figure 3.0)

Figure 3.0:- Total number of extractions carried out by all 3rd and 4th BDS annually from 1998 – 2013. The declining number of extracts is self-evident. The peaks are those of the years when the roll was large – the 'bulge' years. (Data from NHS Tayside's TOPAS 'The out-patient appointment system' and DUDS academic records)



When patients were more plentiful the substance of the procedure carried out at each patient events was recorded, with minimal detail, on a sheet of A4 page. The patient's name, date of birth and teeth extracted was recorded by the student and then signed by the supervising clinician. There were twelve patient events on each side of the A4 sheet and so there were limitations on the detail of the clinical activity, which could be recorded. There was no formal feedback and if any did take place was incidental and unrecorded. Evidence for teeth extracted has developed from an empirical summation of the number of teeth extracted through to, finally, an analytical assessment of each stage of each extraction attempted. That clinical sheets were held in the department is an event that has arrived relatively recently and the way in which they were presented to the students has also changed to make collating marks less time consuming. The clinical sheets were changed, to present them as a portfolio, held in a plastic punched pocket in the department.

I have evolved the collection and recording of clinical activity data over the last fifteen years through several incarnations. In 2004 there was a two-sided sheet for grading twelve patient events, [Appendix 3.1] first of all, the number of patient events that were recorded on the sheet was reduced from twelve to nine as the number of patients seen was falling over these years. [Appendix 3.2] The patient episode had been marked only, on the 1 – 8 University system. A serendipitous advantage of this change was that it allowed more room for each case and encouraged comment, although as yet feedback recording was not formally done. Now the extraction was graded as learning (L) or competent (C) as defined by DUDS (p 2) and the clinical session graded 1 – 8. [Appendix 3.3]

Here too, was introduced a new assessment of the student's professionalism.

- AC - Acceptable – awarded unless there is a deficiency in a student's conduct
- ML- Yellow card - Minor lapse – without affecting patient care
- SL - Red card - Serious lapse – affecting patient care or perceptions

On the obverse of the 2008 grading sheet the number of patients event rows was reduced again to six and the reverse was designed to give three whole session clinical grading slots. [Appendix 3.4] The whole of the exodontia session was marked on a University scale 1-8; as well as each patient episode still marked as L or C. It seemed it was entirely at the supervising clinician's discretion. There was little guidance or explanation of descriptors.

Educational value of feedback for formative assessment becomes ever more prominent. Given at the end of a clinical session it helps the student learn and improve performance; it can be used as a group activity and for peer assessment of each other's abilities. Under prepared and struggling students benefit from this technique [39,40]

Ultimately feedback was included on these sheets. I devised a record sheet with feedback categorised as Strength, Weaknesses. Opportunities and Threats on what became known as 'the SWOT sheet'. More changes, to reduce this to two, were made in response to the still reducing number of extractions carried out by the students such was the reduction in numbers of patients coming into the accident and emergency feeder clinic. [Appendix 3.5] The format also highlighted that this was their feedback opportunity, comment had been made in the National Student Survey that feedback was not given whereas, of course, it had been but had gone unrecognized by the students.

This SWOT system is a standard analytical method for debriefing after an event. It was structured so that each of the criteria had a box to be populated with comments from both staff and students. This gave a structured site for discussing and recording the complexity of the extraction and whether the student had assisted, observed or carried

out the procedure.

In 2010 during a quiet episode in Oral surgery clinic, I discussed with one undergraduate 4th year group the method of assessment of patient episodes. They wanted more directed assessment of the micro-skills of the tasks carried out in the casual clinic and appreciated a feedback aspect. They liked this analytical approach and were used to it as it was used in both periodontology and restorative dentistry where a mark was awarded for each stage of any procedure. [Appendix 3.6, 3.7]

The criteria had to have relevance to the core competency and not be recorded simply because they could. Wrass [41] set out criteria for assessing and examining students' competence and these could be blueprinted to the GDC learning outcomes. [42]

He found that the basic issues of any test were……

Description	*Summative / formative - Be clear about the purpose of the test.*
	Blueprinting - Plan the test against the learning objectives of the course or competencies essential to the speciality.
Validity	*Select appropriate test formats for the competencies to be tested. This action invariably results in a composite examination.*
Reliability	*Sample adequately.* *Clinical competencies are inconsistent across different tasks.*
	Test length is crucial if high-stakes decisions are required. *Use as many examiners as possible.*
Standard setting	*Define endpoint of assessment.*
	Set the appropriate standard e.g., minimum competence - in advance.

Once the checklists were formatted these precepts were followed.

With the phenomenon of decline in numbers of patients accelerating in the past few years, it became increasingly important that the ability to carry out each procedure was intimately examined for its worth. The students' desires and the educational needs then converged to the same point and the record sheet for extractions finally transmogrified into a rubric for each of the mini-skills carried out when treating

patients, for all referred eventualities, in the Oral Surgery department.

- The columns - had the number of teeth removed in each patient and the total number of patients seen was now recorded severally and individually.
- The rows - would correspond to each of the mini-skills that had been blue printed, if possible, from the GDC learning outcomes (LO).

Other criteria to cover the detail not in the GDC broad LO were devised and later validated. This rubric or checklist could then be used for each patient episode. Each column was dedicated to a tooth extraction so that if a patient required multiple extractions then each could be assessed as each may have presented different levels of skill. Although, of course, if they were within the same anaesthetic field this and the 'events in common' would only have one grade for the whole consultation. This could then be used as a starting point for feedback on the students' achievement, at the end of the session.

The other tasks of oral surgery departments were divided into their component parts and for one semester this was a two-sided sheet with the SWOT still separate. The format still separated the clinical data from its feedback and it was difficult to manage the number of sheets, particularly if students kept using new sheets; it was frustrating that they did not staple them together as asked. It was unwieldy for the overall assessment at the end of the semester.

This was the first time Alert boxes were added so that the formality of filling in formal reporting yellow and red cards of the Professionalism system for negative events did not need to be enacted if the member of staff assessing felt uncomfortable doing so. For the junior members of staff from being known to the students, as an undergraduates themselves in DUDS or at least, of the same peer group, it was particularly relevant. The NHS also pointed out how important this recording of the grades for all and the

failing student was.

> *'The students will also have a professionalism grade and an overall (academic) grade for the session which will be discussed with them at the end of the session by the senior staff. Your opinion will input into this grade and it is especially important that you pass on any concerns regarding students as soon as possible.'* [43]

The numbers of patients recorded on one sheet were further reduced so that, if presented with the feedback and grading which only needed two clinic sections to complement the sheet, it could be printed as a single two-sided document. They could run concurrently and could be taken from the department by the Unit secretary, after the clinic, for collating.

Finally here was a comprehensive record of the mini-skills and the feedback, which was well completed by staff and students for delivering a clinical grade at the end of each semester. This was able to be used for further individual comment should it be needed to answer University inquisition i.e. a failing or meritoriously performing student.

There were ten SCOTs [disc] that they could carry out during their three undergraduate clinical years.

3rd 4th & 5th year

1. Patient communication
2. Cross infection control
3. Patient positioning and extraction technique
4. Giving a local anaesthetic for exodontia

4th & 5th year

5. Obtaining informed consent

6. Writing a prescription

7. Taking a tissue biopsy

5th year

8. Designing, raising and handling the tissues of a muco-periosteal flap

9. Sectioning & elevating a tooth

10. Wound closure & intra oral suturing

A copy of each was put into the portfolio for the 3rd and 4th years. The 5th years had them included into their 'Outreach' manual. Copies of all these sheets held on the clinical floor.

Ultimately the clinical data sheets, the method of their use and the feedback SWOT sheet and the ten SCOTs were stapled together and put, as a booklet, into a poly pocket to be presented as an individual portfolio for each student. This was necessary because the students could not be bothered to retrieve and complete a sheet resulting in multiple, sheets for each student. They compounded this unstructured presentation of recording by failing to staple their work together resulting in multiple un-collated sheets. So marking became tediously protracted and the volume of papers almost unmanageable.

3.2 Evolving the OSCE assessment of mannequin extraction by simple demonstration.

The students had a very basic examination, with no checklist, it was the removal of the tooth in a mannequin, which had metal teeth, embedded in a mastic. The students were asked not to remove the tooth or finalised the demonstration extraction?, by manipulating and disposal of the extracted tooth, .

Due to this it was thought that it would have greater validity and relevance if the

extraction were completed on a patient. During the 4th and 5th year 2004 the students' exodontia skills were examined by SCOTs. This method of assessment was

- disrupted the clinic,
- difficult to standardise,
- demanding of staff attention
- very time consuming.

Later all years were examined by OSCE. This could be directed better at the single skill of tooth removal whereas the SCOT was much broader based.

Other schools use SCOTs and much discussion in Association of Dental Education in Europe (ADEE) 2013 was had on whether this was truly an assessment of exodontia. It incorporated many micro skills if the whole of the patient episode was assessed. This meant that a student could successfully extract a tooth but still fail the purported 'extraction assessment' on any of the other sections not related to that skill. This was a much broader interpretation of what it means to extract a tooth. The broader based SCOT assessment is still used in Newcastle, [Appendix 3.9] and could be argued on Wrass' issues that validity in assessing competence results in a composite examination. [41]

3.3 Redesigning the OSCE exodontia assessment checklist.

To examine their spatial reasoning to select a tooth for forceps and forceps for a tooth. On a completed initial checklist of the critical stages of exodontia, there were 25 criteria. The marking of this checklist included a structured scoring system and a global scoring system. The global rating is a subjective assessment of usually a 5 band Likert scale using clinical experience to decide the point of attainment of the student. [87, 88, 89] Some Schools [90] have a detailed descriptor guide to the subjective assessment

which defeats the object but others rely on experienced clinical judgment. This is the case in Dundee where there is no tutoring or descriptors of what each band incorporates and it is judged by personal belief. A checklist is just that and each line examined should incorporate only one skill, which can then be attributed marks either on a yes/no basis with one or zero marks or as yes/borderline/no with two, one or zero marks. It uses a borderline regression to establish the pass / fail boundary.

It was refined by ABAOMS Education Committee where the checklist for exodontia was subjected the Delphi process [86]. Eight were returned and the checklist founded on an agreed reduced seventeen criteria. Given the limited response only to two rounds of the Delphi process were completed.

This checklist [Appendix 3.8] then needed to be validated. Six videos of students taking out an upper and a lower tooth in a mannequin were made. They were edited using Apple iMovie Two of these deliberately included errors but the others were as the students had performed them – correct or not. Since I was to ask colleagues to mark them all if possible, they were kept short 1½ to 2 minutes. This meant asking for a probable time allocation of 15 to 20 minutes, which is a considerable time in anyone's busy day.

The OSCE checklist asks for the student to identify the tooth. The voice over of the students was taken off the sound track and a frame put in to explain which tooth and forceps the student had chosen for each arch. This was to remove any assessment bias from a regional accent variation or of the individual's delivery.

This volume of information was too great for the routine email system so the Drop Box system was used.

Drop Box Inc. is a system of creating any sized file of information in any form, which can then be viewed, on any computer, using Cloud based storage technology. It

can also be accessed through a mobile phone application. The intended recipient is emailed and a security code is attached to allow access to the cloud storage.

The apparently current eighty-one members of the ABAOMS were emailed a Drop Box of these videos and checklist. It was circulated to the four academic staff in DUDS by USB flash drive. There was one 3rd year group (each year being split into ten groups) and one 4th year group who were encouraged to complete this and one SHO completed it.

The videos replicated the scenario that would be played out during an OSCE. The tooth for extraction was of the student's choosing after being presented with a pair of first upper and then lower forceps. A script was devised so that each had the same information.

"Will you please take out any tooth for which this pair of forceps is suitable?"

There was no instruction for a specific extraction. They had to decide which arch was suitable and which tooth. Whilst carrying out the demonstration they also exposed which was their dominant hand. This allowed the second extraction script.

"Will you please take out any tooth on the (insert student's dominant side) of the mannequin for which this pair of forceps is suitable."

This should then change the student's position without the verbal prompt of "Where would you stand if you had to take out a lower (insert dominant side) tooth". A prompt which all students had responded to correctly when given in the past. It was obviously appropriate for right and left handed students, but was appropriate for the ambidextrous student too. They would have to change hands – the scenario meant that they had to remember that the quadrant used different mechanical criteria. All had to make an unprompted change.

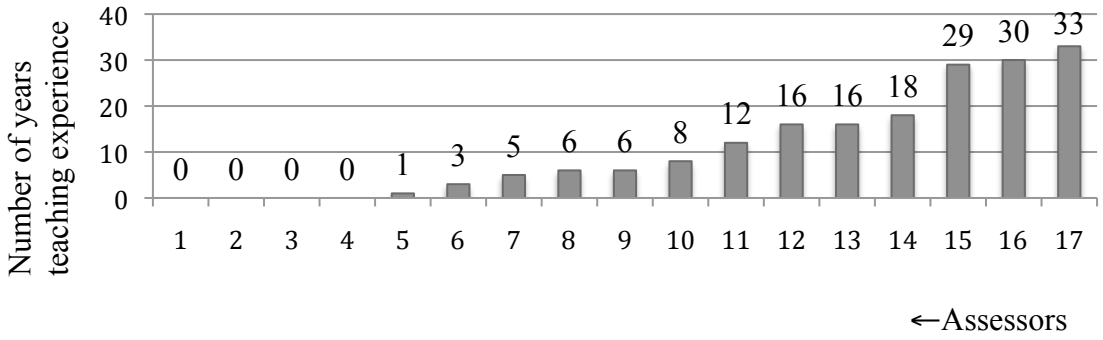
3.4 Results of Validating the Extraction OSCE Checklist.

Two members completed the task during the ABAOMS annual conference. Four in house academic staff, two junior staff responses were returned and two student groups of six responded. They had been approached on the clinic and given USB pegs to complete the task.

There were only five responses from the Drop Box system. The problem with this method of dispensing the task was that it 'rolled off' after a short time and if not responded to briskly (2 weeks) the pass code became corrupt.

After ABAOMS conference and Drop Box trial, twenty-five memory sticks were posted and nine completed and returned (36%). Two more were presented; they had been handed on from the prime receiver to other staff in their oral surgery department, for completion.

Figure 3.1: - Teaching experience of the assessors numbered 1 - 17; the grey bars chart this as 0 – 33 years against the number of the assessor. The range was from graduate to those near retirement.

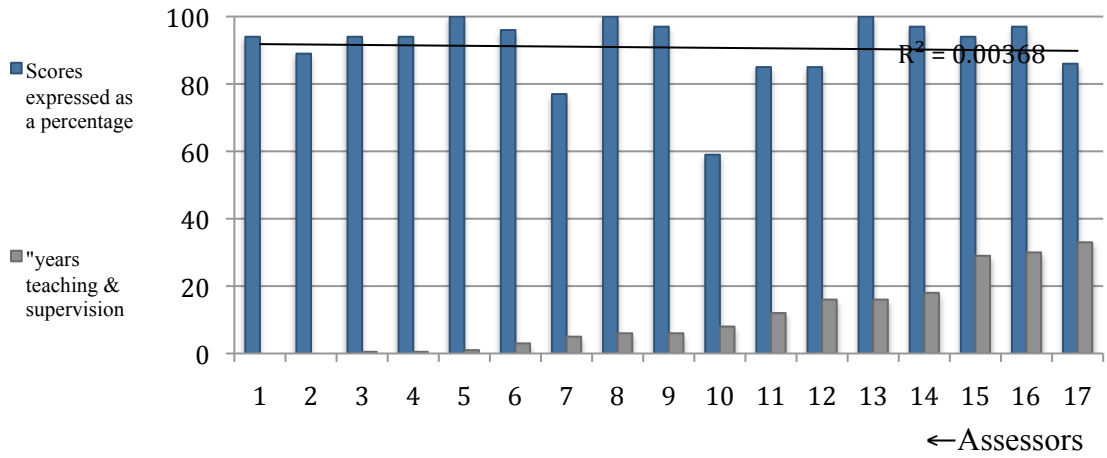


Two assessments were by peer group (Figure 3.1 columns 1 and 2) and some graduate assessors (Figure 3.1 columns 3 and 4) had little experience supervising and assessing students. They were a DF and an SHO (Figure 3.1 columns 3 and 4 respectively), who had only been supervising the students for a few months and with the undergraduate 3rd and 4th years (Figure 3.1 column 1 to 2 respectively) they were entered into the data

sheet as 0 years. Within the fifteen assessors there was a wide range, 1 – 33 years, of teaching experience in addition to the two undergraduate and two postgraduate assessors in the early years of their careers, who completed this task.

All of these charts' scores were numbered in increasing years of experience from left to right. The first two were undergraduates and the next two were graduates who had been supervising students for less than six months, ending with the assessor with thirty-three years' experience in the last column on the right. Teaching experience increases on these graphs from left to right.

Figure 3.2:- Teaching experience of the Assessors in years plotted against Video 1 Scores. The grey bars are the years of teaching experience and the blue bars the percentage score they awarded to this video. There grade allocation association was random when compared to teaching experience.



This graphing of data (Figure 3.2) was replicated for the other five videos and it was found that the only correlation between scores was with years of experience and active clinical teaching. If the tutors and undergraduates of less than six months experience were removed from the analysis there was a correlation of the scores. There was one long serving tutor that was removed as well as it was of note that they did no and had not done clinical teaching for many years. Current clinical teaching experience of two

years or more allows these videos to be assessed with the checklist and the tutors to agree with each other in this exercise.

Assessors 10 and 16, with 8 and many years experience respectively, show the greatest variation in the inter-examiner assessment. And yet Assessor 16 globally, passes the video with one of their lowest scores! Assessor 10 is in the least agreement with all the others. At least one of the assessors had passed the students in each of the videos.

By inspection the most agreement is centered over videos 2 and 6 and these had been designed as exhibiting the skills sufficiently to reach a pass standard. The video 4 was designed to have a tooth other than that which the student indicated, extracted. It was put in to see how untutored examiners assessed this. The other videos 1,2 and 5 included some faults but that were at least of borderline standard as would be passed in an OSCE at Dundee, where knowledge of the various teaching idiosyncrasies which might otherwise be regarded as non-standard operating' could influence the scoring. The checklist scores were plotted against the pass-fail global scores that had been allotted to them and I found many anomalies in score versus global ratings.